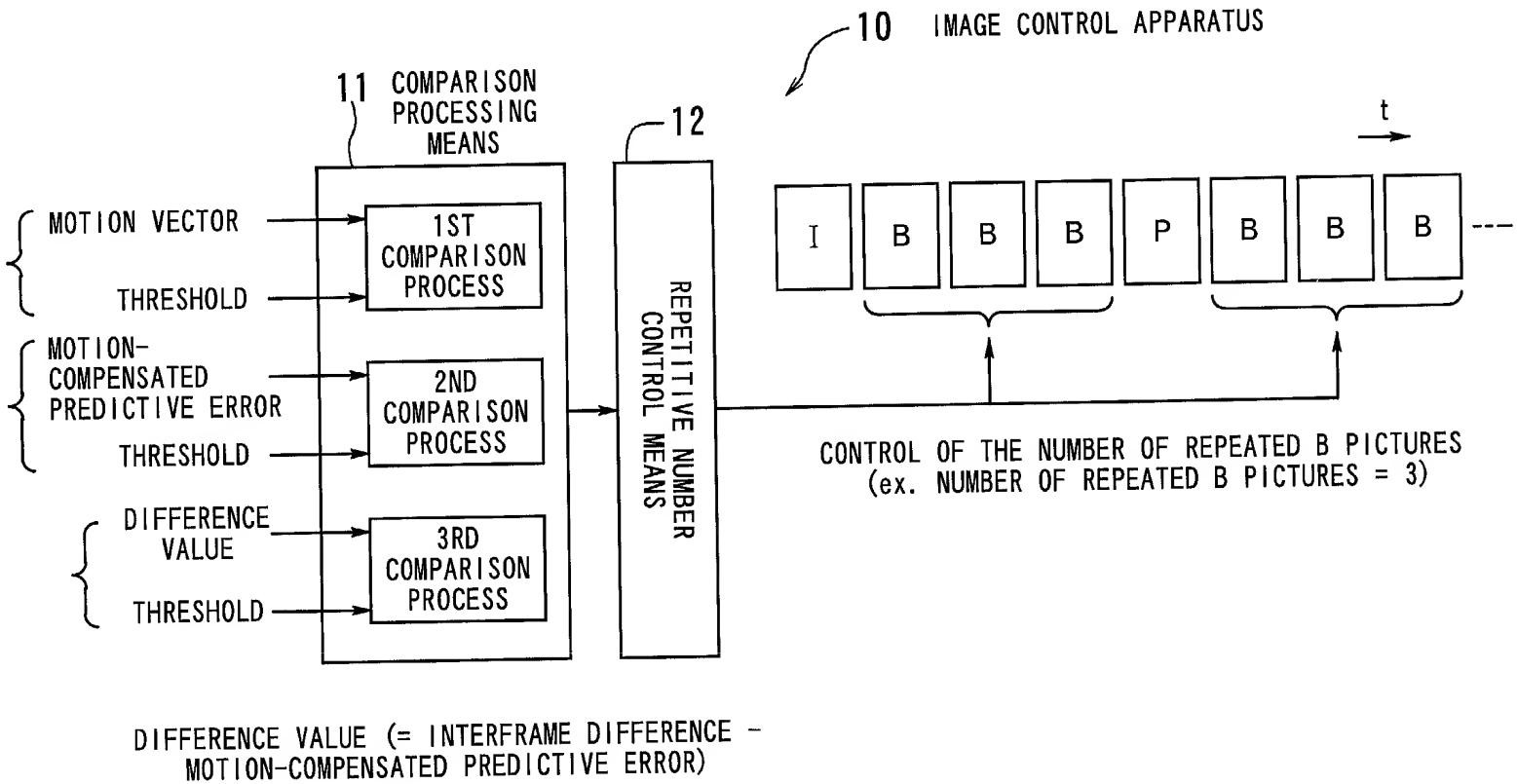
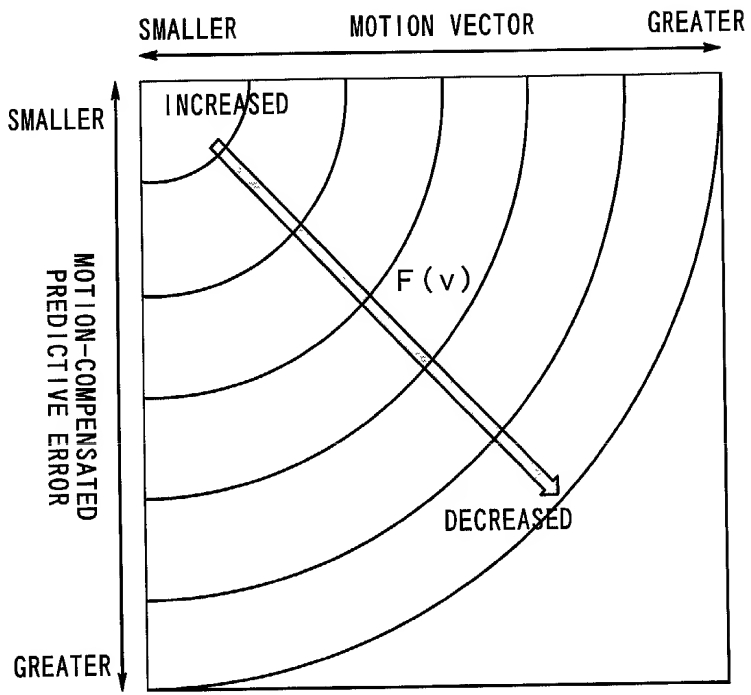


FIG. 1

$$F = F(v) + F(e)$$

- F: DIRECTION FOR CONTROLLING THE NUMBER OF REPEATED B PICTURES
- F(v): DIDRECTION FOR CONTROLLING THE NUMBER OF REPEATED B PICTURES DETERMINED FROM RELATION DIAGRAM Z1
- F(e): DIDRECTION FOR CONTROLLING THE NUMBER OF REPEATED B PICTURES DETERMINED FROM INEQUALITY Z2

⇩



Z1 RELATION DIAGRAM

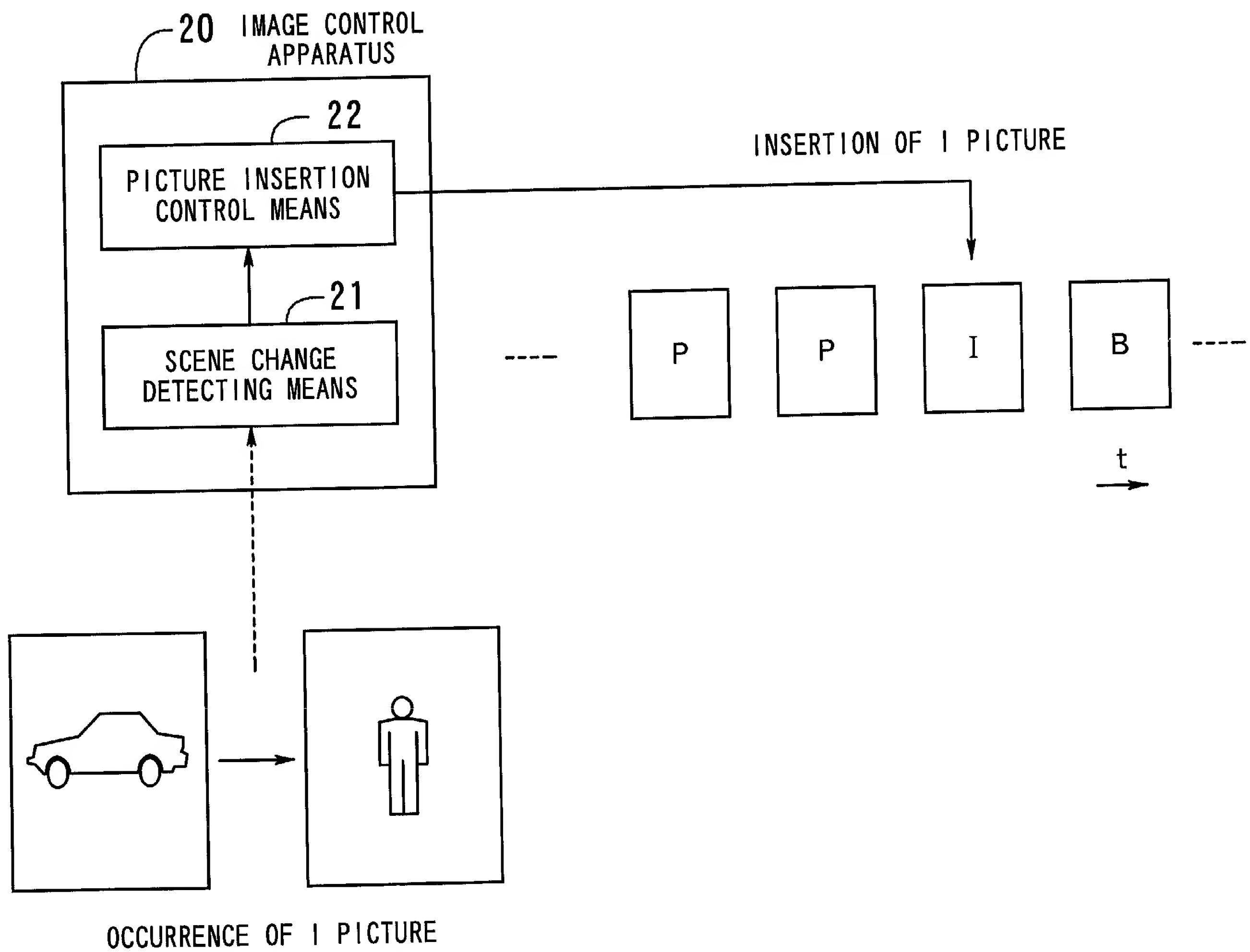
F(e) = INCREASE: DIFFERENCE VALUE > THRESHOLD

F(e) = DECREASE: DIFFERENCE VALUE < THRESHOLD

Z2

DIFFERENCE VALUE (= INTERFRAME DIFFERENCE - MOTION-COMPENSATED PREDICTIVE ERROR)

FIG. 2


20 IMAGE CONTROL APPARATUS
22
PICTURE INSERTION CONTROL MEANS
21
SCENE CHANGE DETECTING MEANS
INSERTION OF I PICTURE

P
P
I
B
----
t
OCCURRENCE OF I PICTURE

FIG. 3

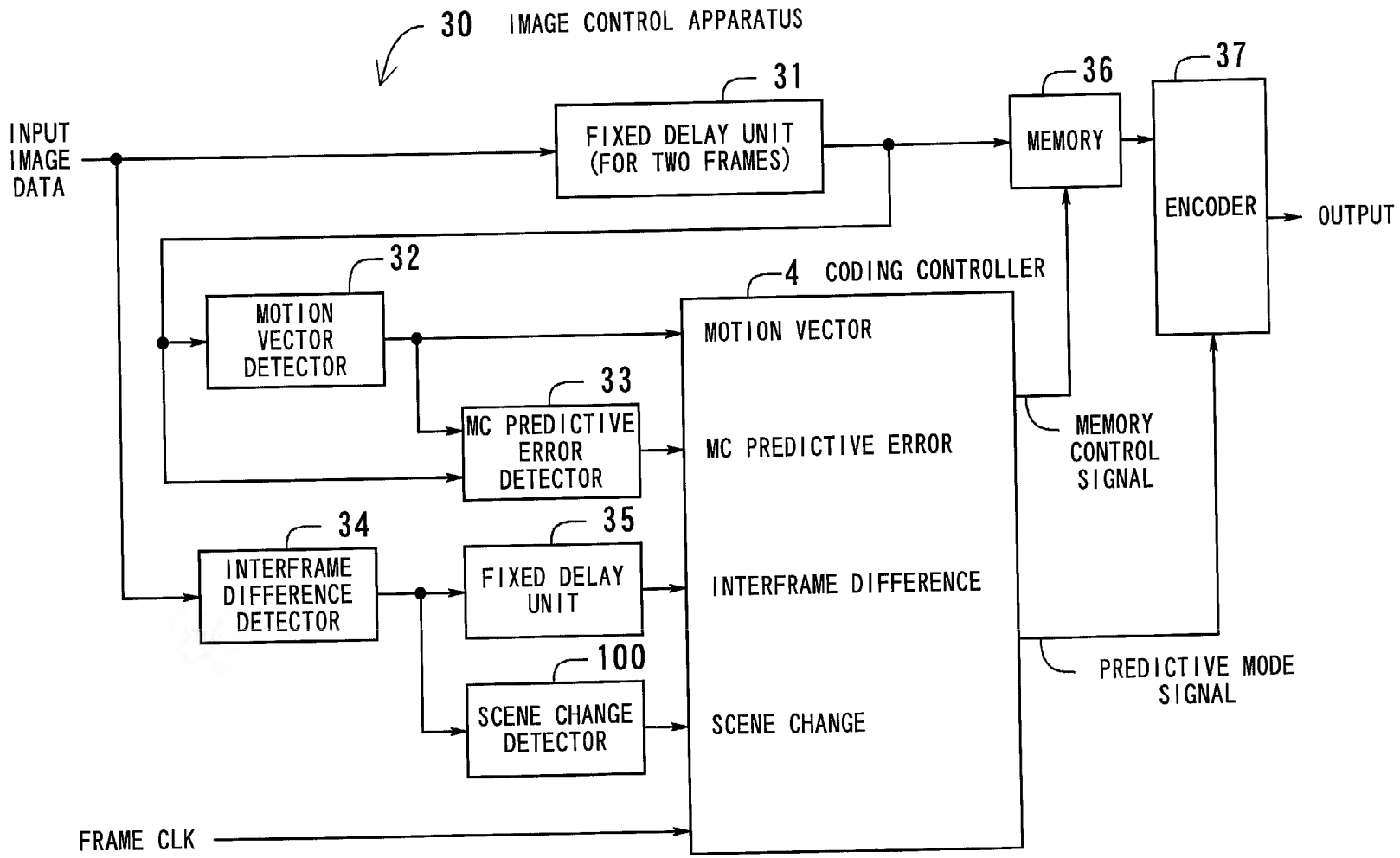

30
IMAGE CONTROL APPARATUS
31
FIXED DELAY UNIT
(FOR TWO FRAMES)
36
MEMORY
37
ENCODER
OUTPUT
INPUT
IMAGE
DATA
32
MOTION
VECTOR
DETECTOR
4
CODING CONTROLLER
MOTION VECTOR
33
MC PREDICTIVE
ERROR
DETECTOR
MC PREDICTIVE ERROR
MEMORY
CONTROL
SIGNAL
34
INTERFRAME
DIFFERENCE
DETECTOR
35
FIXED DELAY
UNIT
INTERFRAME DIFFERENCE
100
SCENE CHANGE
DETECTOR
SCENE CHANGE
PREDICTIVE MODE
SIGNAL
FRAME CLK

FIG. 4

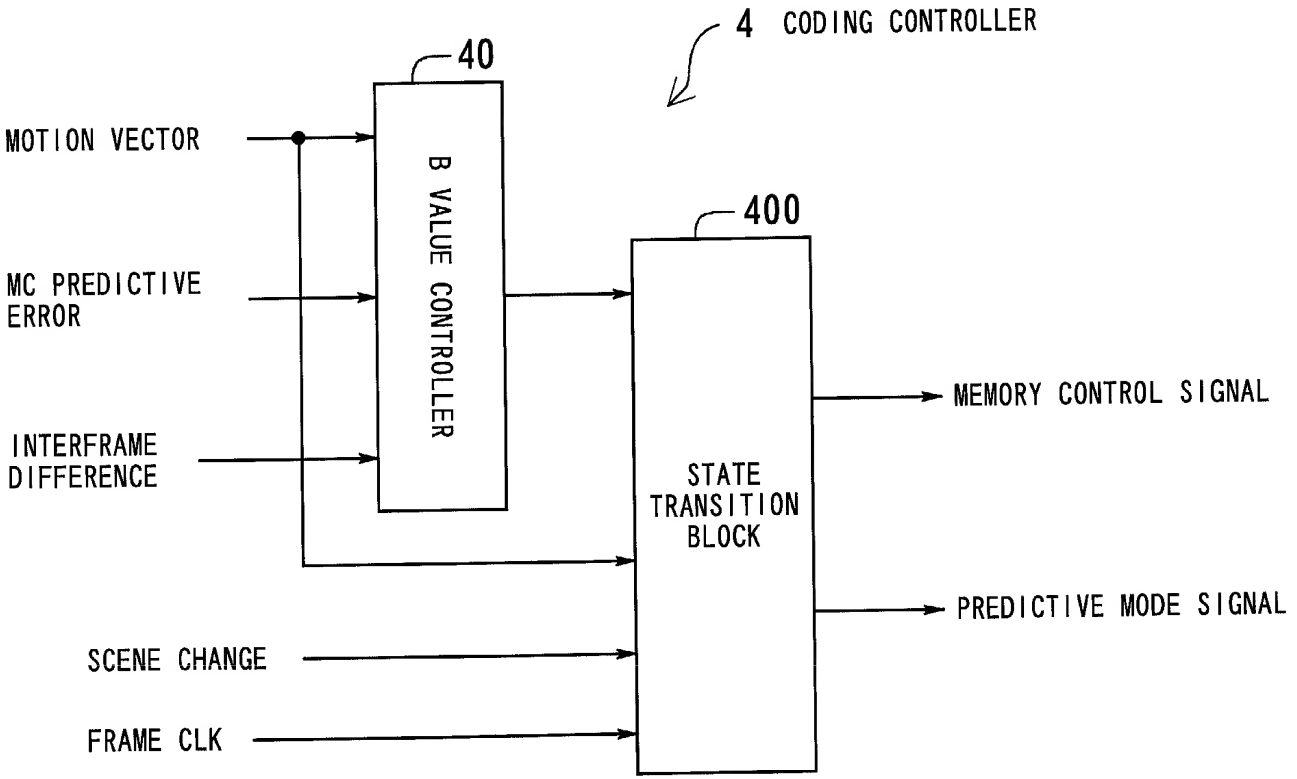


FIG. 5

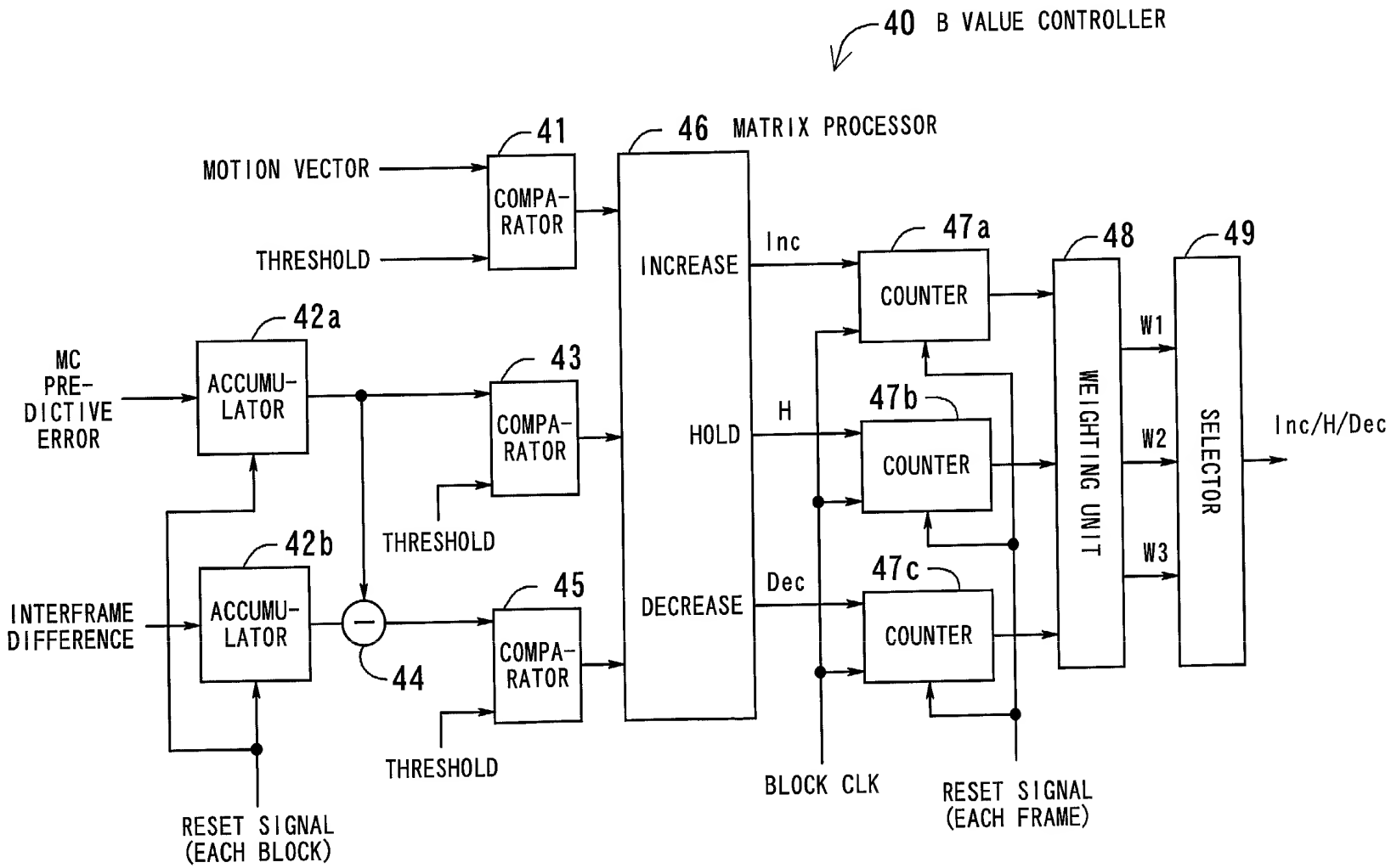


FIG. 6

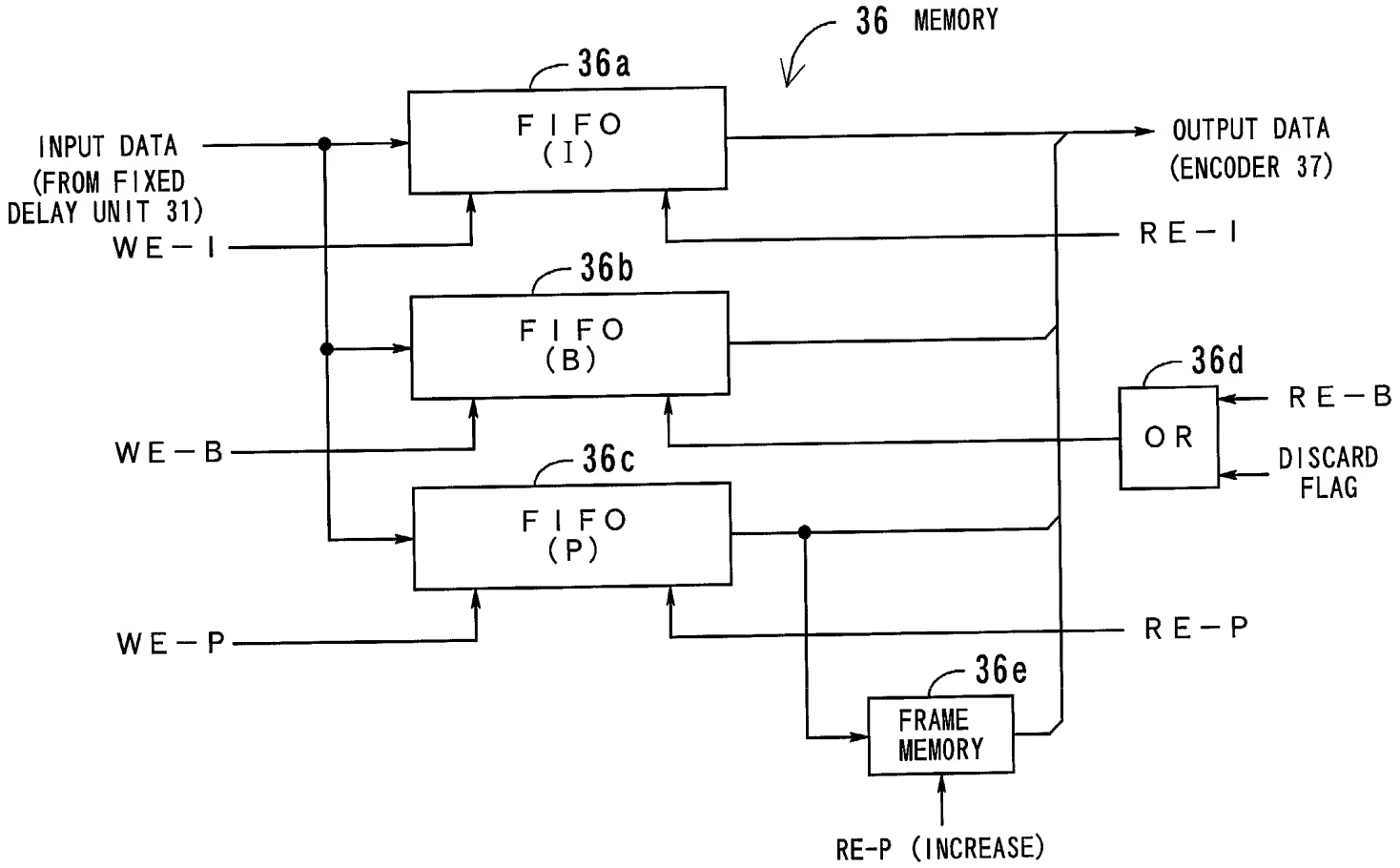


FIG. 7

T MATRIX TABLE

MOTION VECTOR	MC PREDICTIVE ERROR	DIFFERENCE VALUE	OUTPUT	STATE
0 (INCREASE)	0 (INCREASE)	0	Inc	REGARDED AS STILL IMAGE
0 (INCREASE)	0 (INCREASE)	1 (INCREASE)	Inc	MOTION VECTOR IS EFFECTIVE / MOTION VECTOR IS SMALL
0 (INCREASE)	1	0	H	MOTION VECTOR IS NOT EFFECTIVE / MOTION VECTOR IS SMALL
0 (INCREASE)	1	1 (INCREASE)	Inc	MOTION VECTOR IS EFFECTIVE / MOTION VECTOR IS SMALL
1	0 (INCREASE)	0	H	MOTION VECTOR IS LARGE, NOT EFFECTIVE / MC PREDICTIVE OR IS SMALL
1	0 (INCREASE)	1 (INCREASE)	Inc	MOTION VECTOR IS EFFECTIVE / MC PREDICTIVE ERROR IS SMALL
1	1	0	Dec	MOTION VECTOR IS NOT EFFECTIVE / MC PREDICTIVE ERROR IS LARGE
1	1	1 (INCREASE)	H	MOTION VECTOR IS EFFECTIVE / MC PREDICTIVE ERROR IS LARGE

1: GREATER THAN THRESHOLD

0: SMALLER THAN THRESHOLD

(INCREASE): THE NUMBER OF REPEATED B PICTURES IS INCREASED

FIG. 8

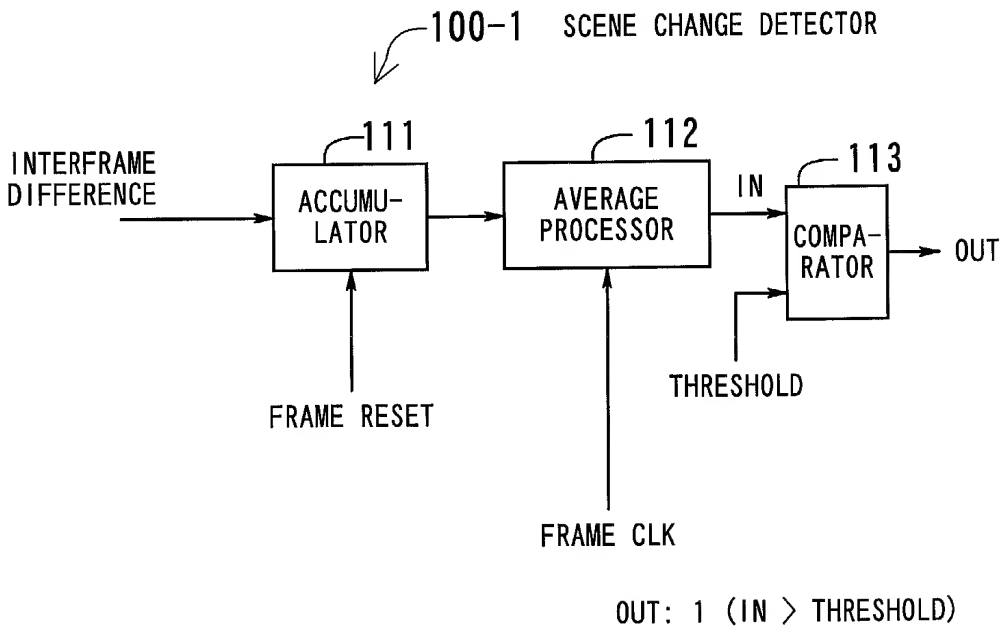


FIG. 9

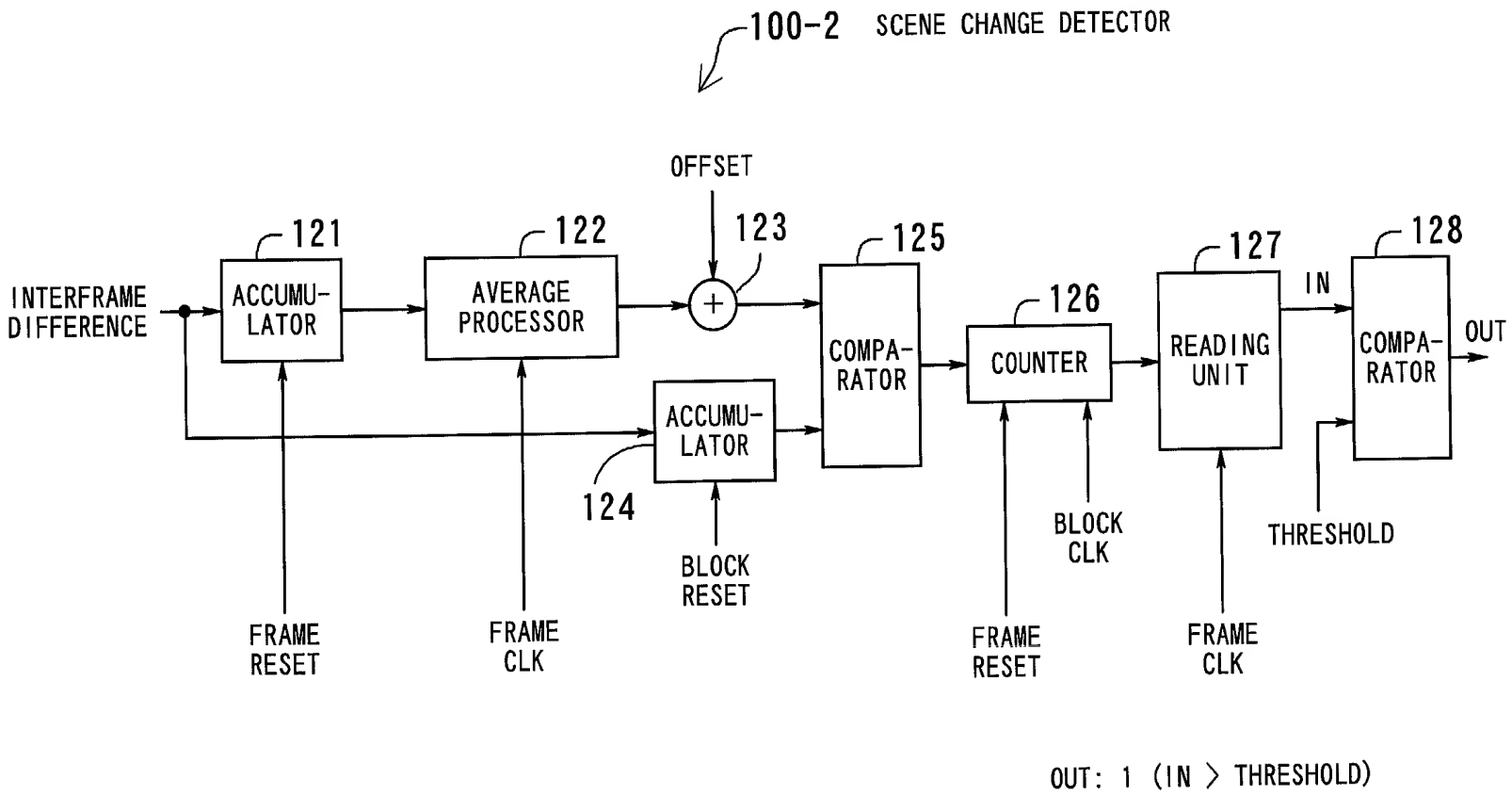

100-2 SCENE CHANGE DETECTOR
OFFSET
121
122
123
125
127
128
INTERFRAME DIFFERENCE
ACCUMU-LATOR
AVERAGE PROCESSOR
COMPA-RATOR
126
COUNTER
READING UNIT
IN
COMPA-RATOR
OUT
ACCUMU-LATOR
124
BLOCK RESET
BLOCK CLK
THRESHOLD
FRAME RESET
FRAME CLK
FRAME RESET
FRAME CLK
OUT: 1 (IN > THRESHOLD)

FIG. 10

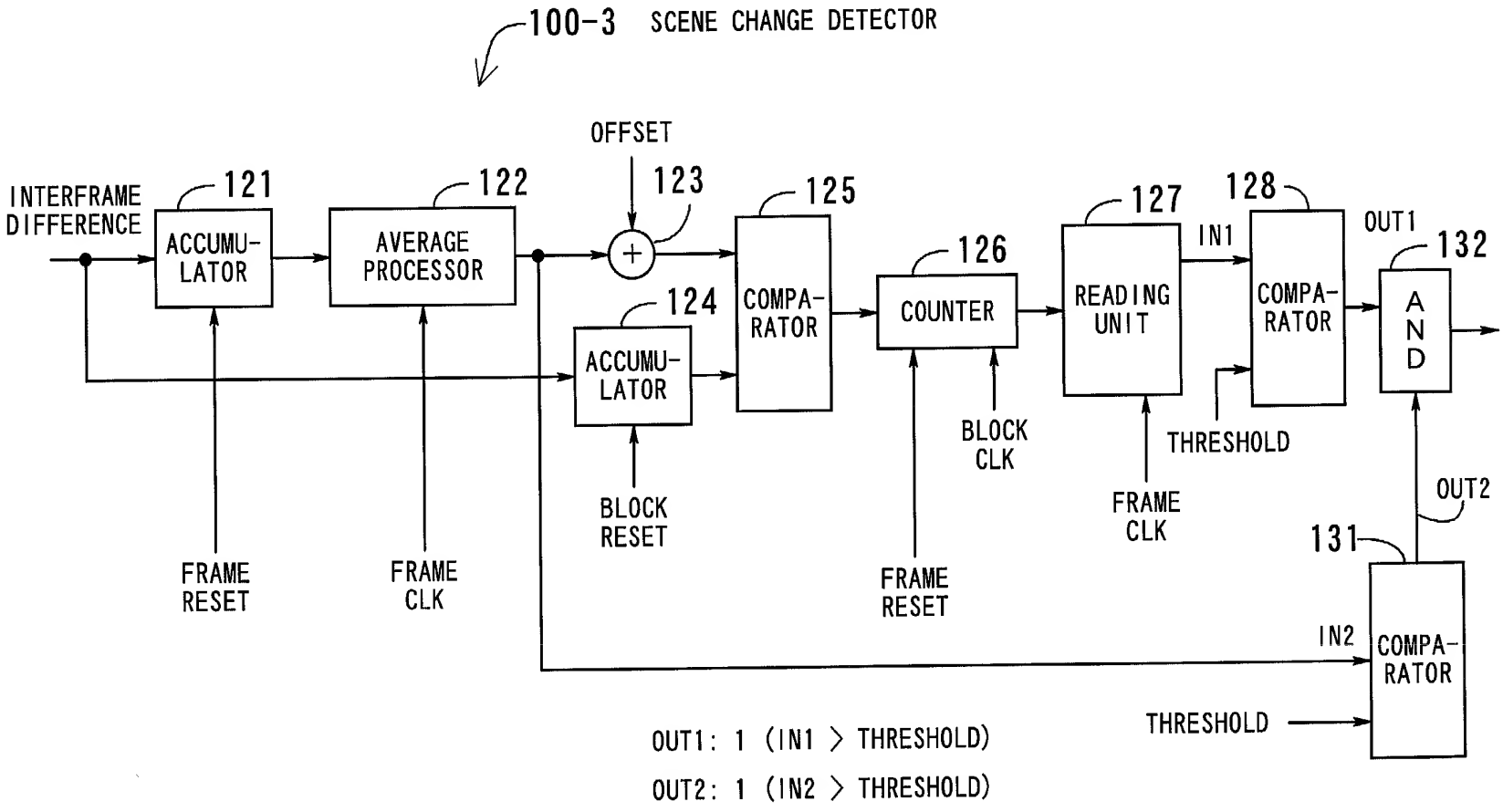

100-3 SCENE CHANGE DETECTOR
INTERFRAME DIFFERENCE
121
ACCUMU-LATOR
122
AVERAGE PROCESSOR
OFFSET
123
125
COMPA-RATOR
124
ACCUMU-LATOR
126
COUNTER
127
READING UNIT
IN1
128
COMPA-RATOR
OUT1
132
AND
OUT2
131
COMPA-RATOR
IN2
THRESHOLD
FRAME RESET
FRAME CLK
BLOCK RESET
FRAME RESET
BLOCK CLK
FRAME CLK
THRESHOLD
OUT1: 1 (IN1 > THRESHOLD)
OUT2: 1 (IN2 > THRESHOLD)

FIG. 11

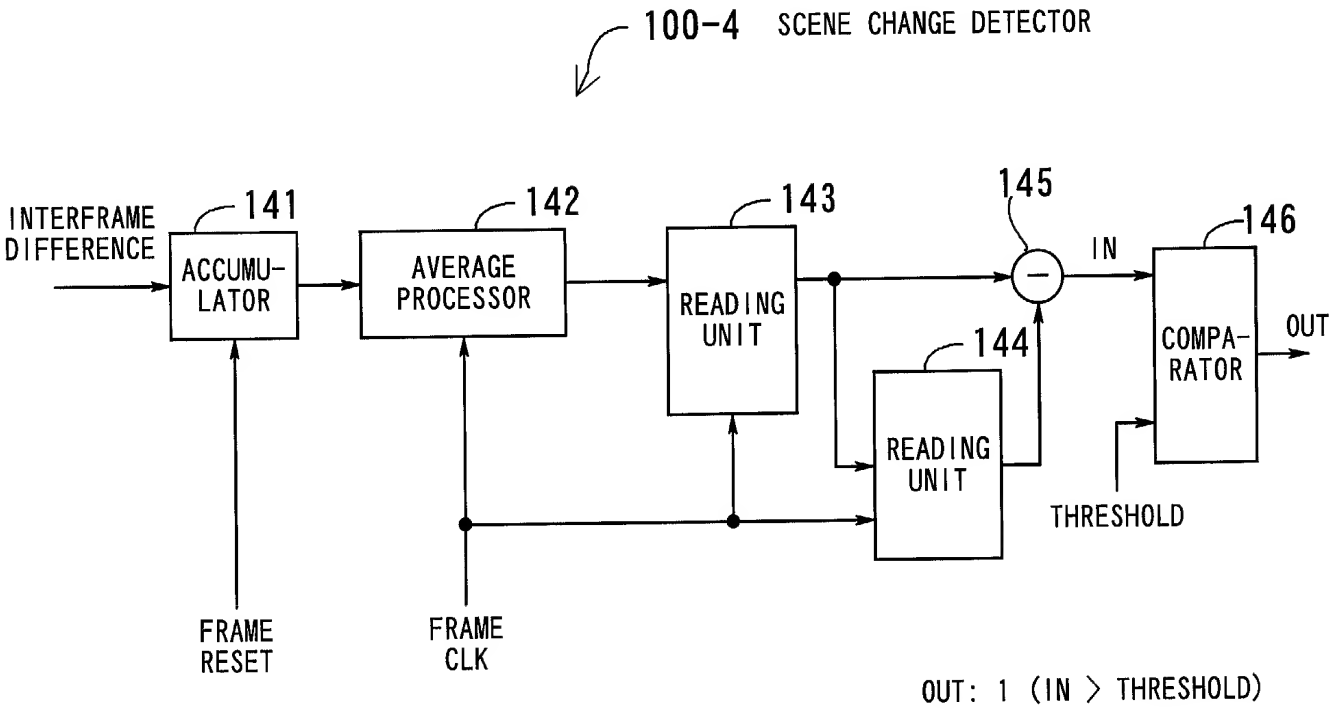


FIG. 12

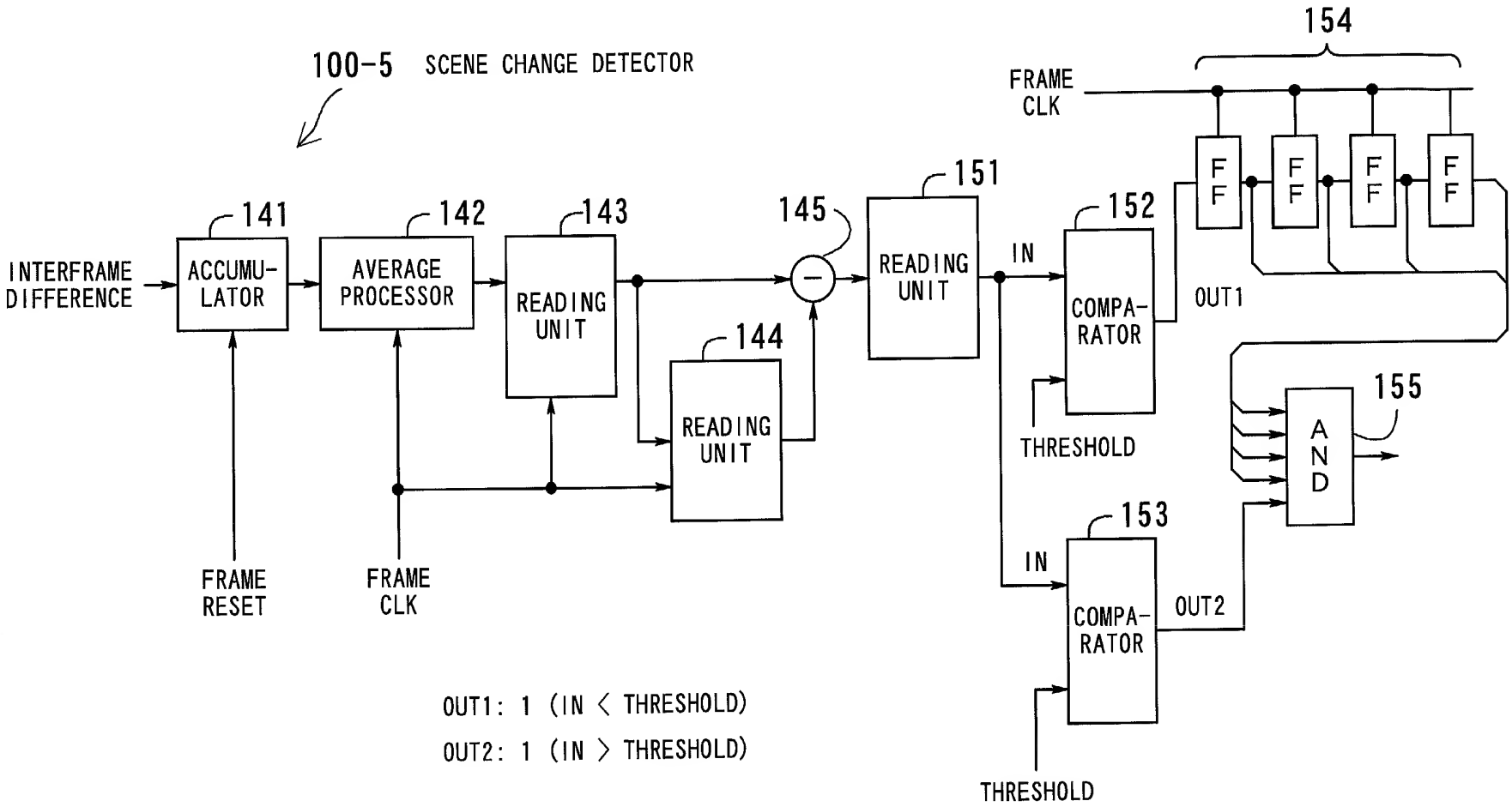

100-5 SCENE CHANGE DETECTOR
INTERFRAME DIFFERENCE
ACCUMU-LATOR
141
AVERAGE PROCESSOR
142
READING UNIT
143
READING UNIT
144
145
READING UNIT
151
IN
COMPA-RATOR
152
THRESHOLD
154
FRAME CLK
FF
FF
FF
FF
OUT1
AND
155
IN
COMPA-RATOR
153
OUT2
THRESHOLD
FRAME RESET
FRAME CLK
OUT1: 1 (IN < THRESHOLD)
OUT2: 1 (IN > THRESHOLD)

FIG. 13

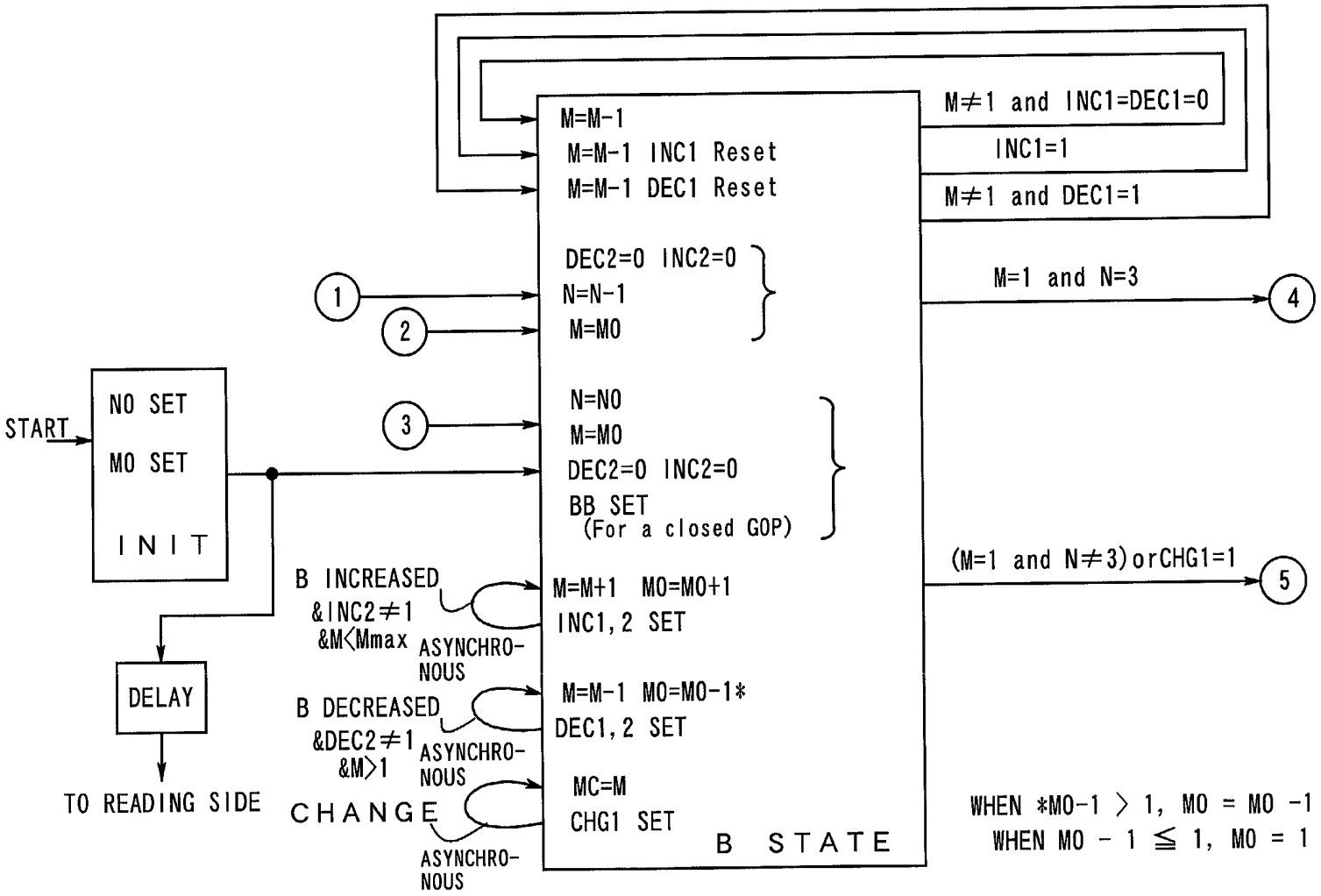

START
N0 SET
M0 SET
INIT
DELAY
TO READING SIDE
M=M-1
M=M-1 INC1 Reset
M=M-1 DEC1 Reset
M≠1 and INC1=DEC1=0
INC1=1
M≠1 and DEC1=1
DEC2=0 INC2=0
N=N-1
M=M0
M=1 and N=3
4
1
2
3
N=N0
M=M0
DEC2=0 INC2=0
BB SET
(For a closed GOP)
(M=1 and N≠3)orCHG1=1
5
B INCREASED
&INC2≠1
&M<Mmax
ASYNCHRO-
NOUS
M=M+1 M0=M0+1
INC1, 2 SET
B DECREASED
&DEC2≠1
&M>1
ASYNCHRO-
NOUS
M=M-1 M0=M0-1*
DEC1, 2 SET
CHANGE
ASYNCHRO-
NOUS
MC=M
CHG1 SET
B STATE
WHEN *M0-1 > 1, M0 = M0 -1
WHEN M0 - 1 ≦ 1, M0 = 1

FIG. 14

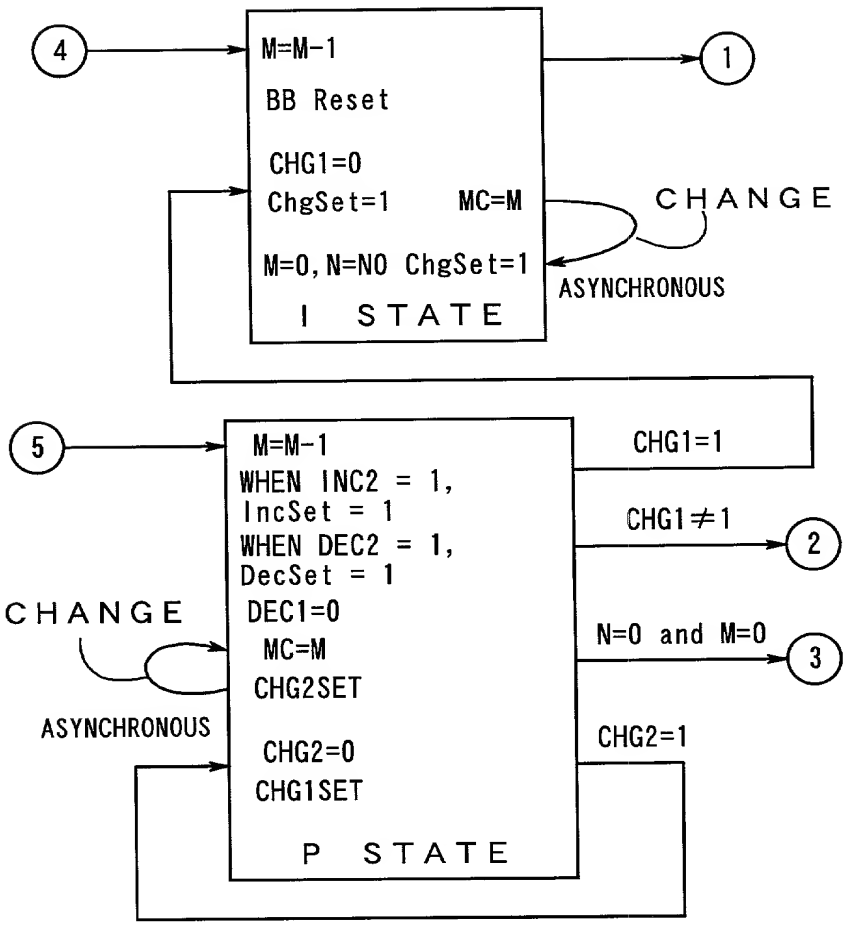

4
M=M-1
BB Reset
CHG1=0
ChgSet=1
MC=M
M=0, N=NO ChgSet=1
I STATE
1
CHANGE
ASYNCHRONOUS
5
M=M-1
WHEN INC2 = 1,
IncSet = 1
WHEN DEC2 = 1,
DecSet = 1
DEC1=0
MC=M
CHG2SET
CHG2=0
CHG1SET
P STATE
CHG1=1
CHG1≠1
2
N=0 and M=0
3
CHG2=1
CHANGE
ASYNCHRONOUS

FIG. 15

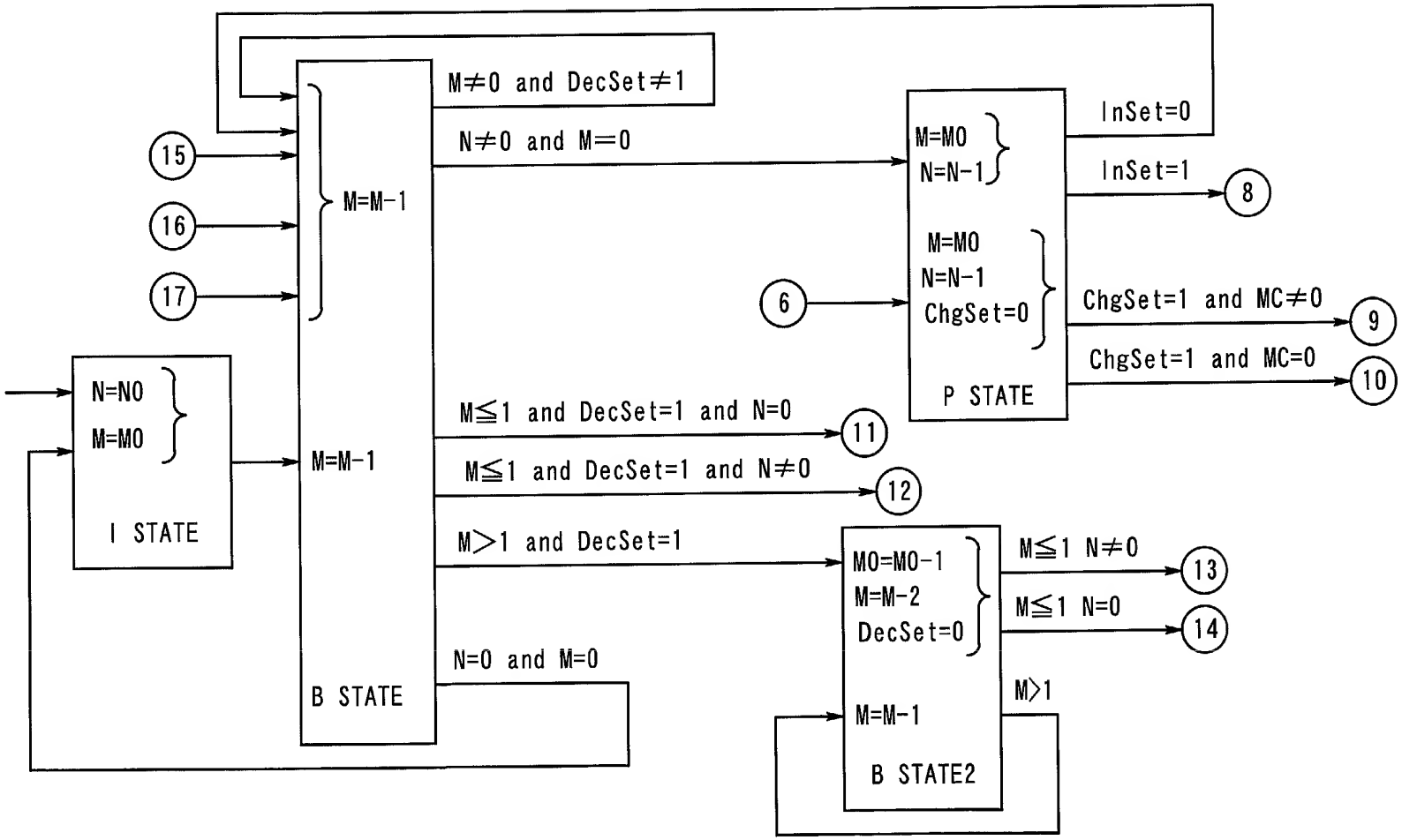


FIG. 16

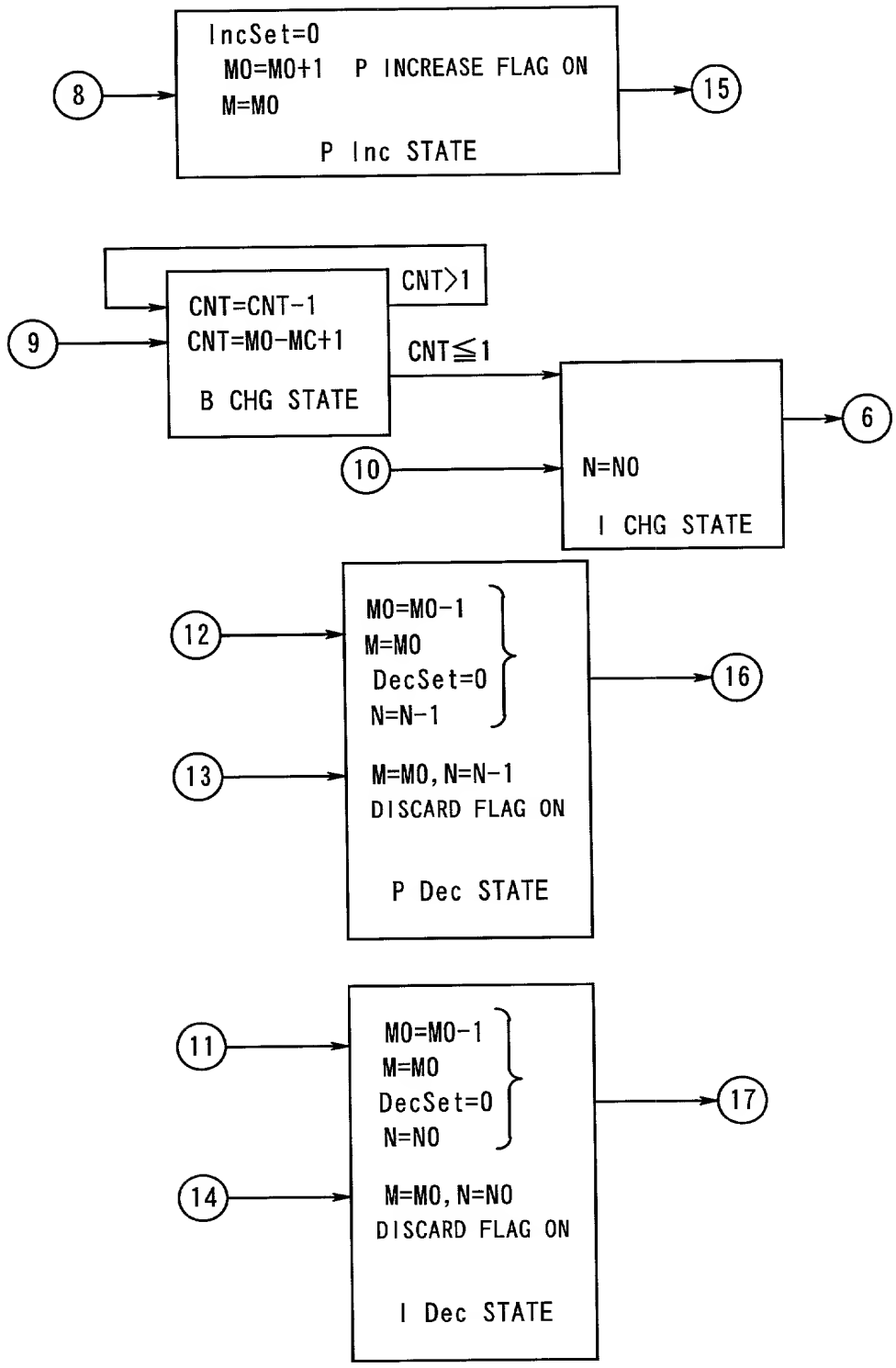

IncSet=0
MO=MO+1 P INCREASE FLAG ON
M=MO
P Inc STATE
8
15
CNT=CNT-1
CNT=MO-MC+1
B CHG STATE
CNT>1
CNT≦1
9
10
N=NO
I CHG STATE
6
MO=MO-1
M=MO
DecSet=0
N=N-1
M=MO, N=N-1
DISCARD FLAG ON
P Dec STATE
12
13
16
MO=MO-1
M=MO
DecSet=0
N=NO
M=MO, N=NO
DISCARD FLAG ON
I Dec STATE
11
14
17

FIG. 17

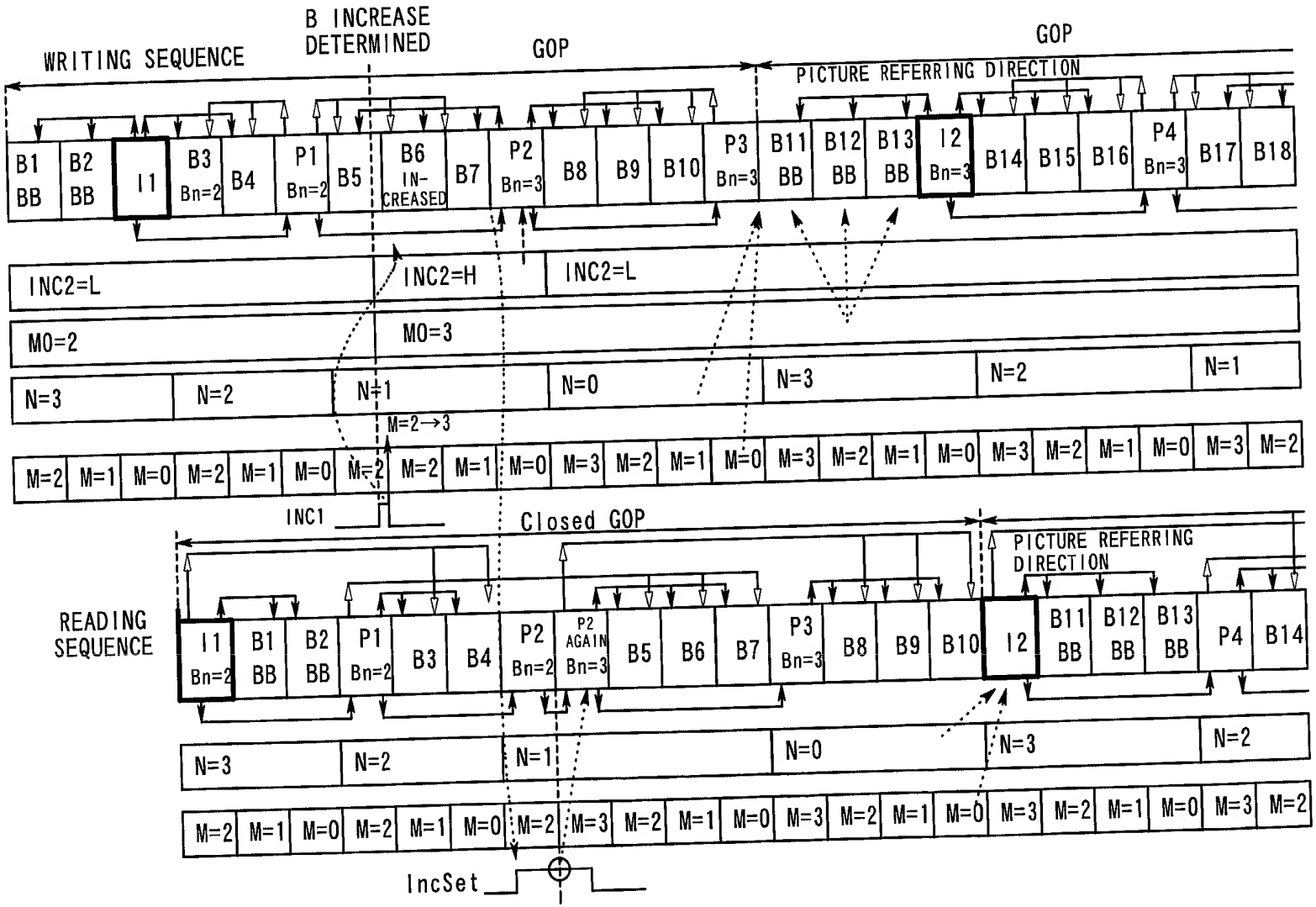

WRITING SEQUENCE
B INCREASE DETERMINED
GOP
GOP
PICTURE REFERRING DIRECTION
B1 BB
B2 BB
I1
B3 Bn=2
B4
P1 Bn=2
B5
B6 IN-CREASED
B7
P2 Bn=3
B8
B9
B10
P3 Bn=3
B11 BB
B12 BB
B13 BB
I2 Bn=3
B14
B15
B16
P4 Bn=3
B17
B18
INC2=L
INC2=H
INC2=L
M0=2
M0=3
N=3
N=2
N+1
N=0
N=3
N=2
N=1
M=2→3
M=2 M=1 M=0 M=2 M=1 M=0 M=2 M=2 M=1 M=0 M=3 M=2 M=1 M=0 M=3 M=2 M=1 M=0 M=3 M=2 M=1 M=0 M=3 M=2
INC1
Closed GOP
PICTURE REFERRING DIRECTION
READING SEQUENCE
I1 Bn=2
B1 BB
B2 BB
P1 Bn=2
B3
B4
P2 Bn=2
P2 AGAIN Bn=3
B5
B6
B7
P3 Bn=3
B8
B9
B10
I2
B11 BB
B12 BB
B13 BB
P4
B14
N=3
N=2
N=1
N=0
N=3
N=2
M=2 M=1 M=0 M=2 M=1 M=0 M=2 M=3 M=2 M=1 M=0 M=3 M=2 M=1 M=0 M=3 M=2 M=1 M=0 M=3 M=2
IncSet

FIG. 18

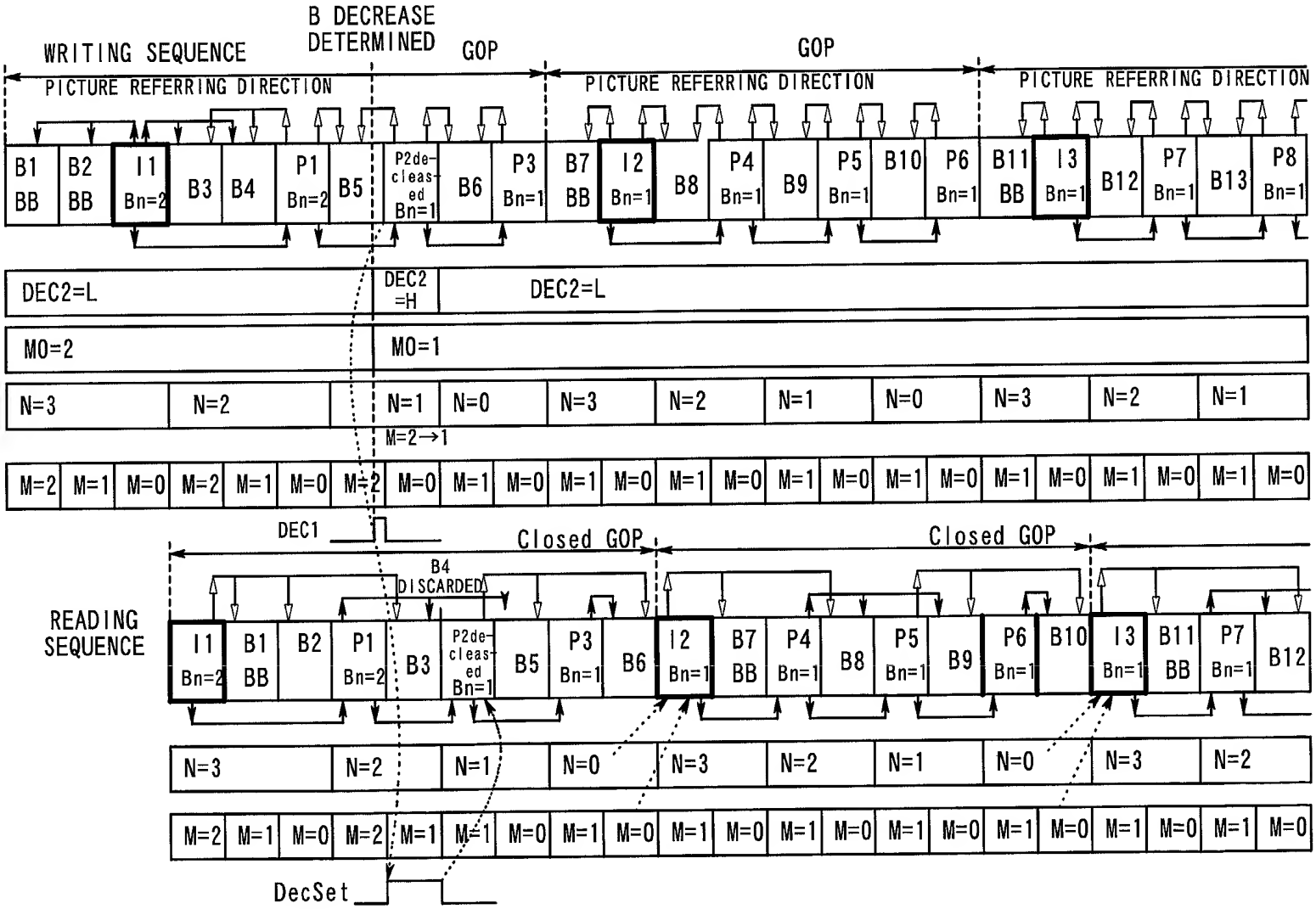

B DECREASE DETERMINED
WRITING SEQUENCE
GOP
GOP
PICTURE REFERRING DIRECTION
PICTURE REFERRING DIRECTION
PICTURE REFERRING DIRECTION
B1 BB
B2 BB
I1 Bn=2
B3
B4
P1 Bn=2
B5
P2de-cleased Bn=1
B6
P3 Bn=1
B7 BB
I2 Bn=1
B8
P4 Bn=1
B9
P5 Bn=1
B10
P6 Bn=1
B11 BB
I3 Bn=1
B12
P7 Bn=1
B13
P8 Bn=1
DEC2=L
DEC2 =H
DEC2=L
MO=2
MO=1
N=3
N=2
N=1
N=0
N=3
N=2
N=1
N=0
N=3
N=2
N=1
M=2→1
M=2 M=1 M=0 M=2 M=1 M=0 M=2 M=0 M=1 M=0 M=1 M=0 M=1 M=0 M=1 M=0 M=1 M=0 M=1 M=0 M=1 M=0 M=1 M=0 M=1 M=0
DEC1
Closed GOP
Closed GOP
B4 DISCARDED
READING SEQUENCE
I1 Bn=2
B1 BB
B2
P1 Bn=2
B3
P2de-cleased Bn=1
B5
P3 Bn=1
B6
I2 Bn=1
B7 BB
P4 Bn=1
B8
P5 Bn=1
B9
P6 Bn=1
B10
I3 Bn=1
B11 BB
P7 Bn=1
B12
N=3
N=2
N=1
N=0
N=3
N=2
N=1
N=0
N=3
N=2
M=2 M=1 M=0 M=2 M=1 M=1 M=0 M=1 M=0 M=1 M=0 M=1 M=0 M=1 M=0 M=1 M=0 M=1 M=0 M=1 M=0 M=1 M=0
DecSet

FIG. 19

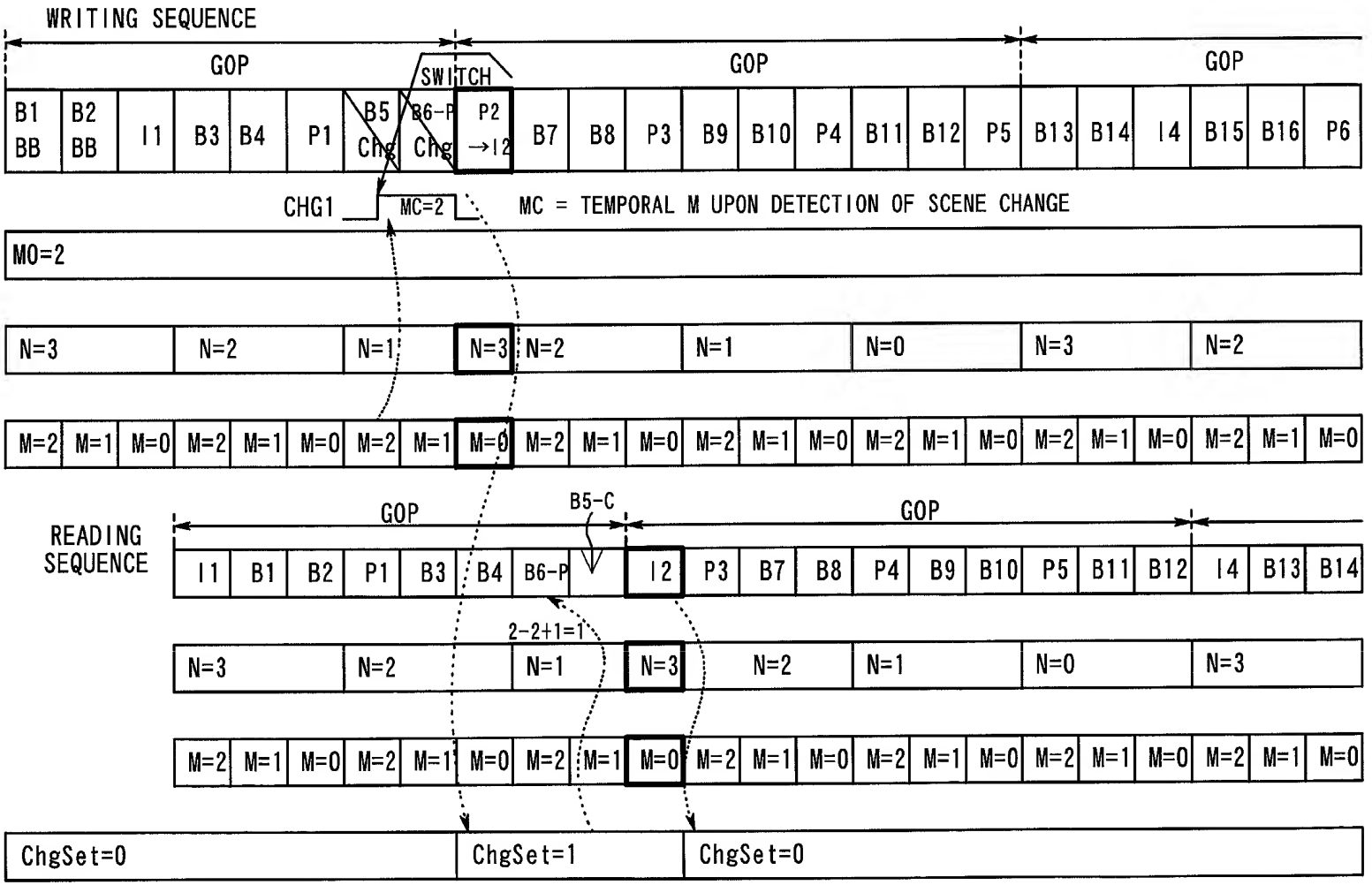

WRITING SEQUENCE
GOP
SWITCH
GOP
GOP
B1 BB
B2 BB
I1
B3
B4
P1
B5 Chg
B6-P Chg
P2 →I2
B7
B8
P3
B9
B10
P4
B11
B12
P5
B13
B14
I4
B15
B16
P6
CHG1
MC=2
MC = TEMPORAL M UPON DETECTION OF SCENE CHANGE
M0=2
N=3
N=2
N=1
N=3
N=2
N=1
N=0
N=3
N=2
M=2 M=1 M=0 M=2 M=1 M=0 M=2 M=1 M=0 M=2 M=1 M=0 M=2 M=1 M=0 M=2 M=1 M=0 M=2 M=1 M=0 M=2 M=1 M=0
READING SEQUENCE
GOP
B5-C
GOP
I1
B1
B2
P1
B3
B4
B6-P
I2
P3
B7
B8
P4
B9
B10
P5
B11
B12
I4
B13
B14
2-2+1=1
N=3
N=2
N=1
N=3
N=2
N=1
N=0
N=3
M=2 M=1 M=0 M=2 M=1 M=0 M=2 M=1 M=0 M=2 M=1 M=0 M=2 M=1 M=0 M=2 M=1 M=0 M=2 M=1 M=0 M=2 M=1 M=0
ChgSet=0
ChgSet=1
ChgSet=0

FIG. 20

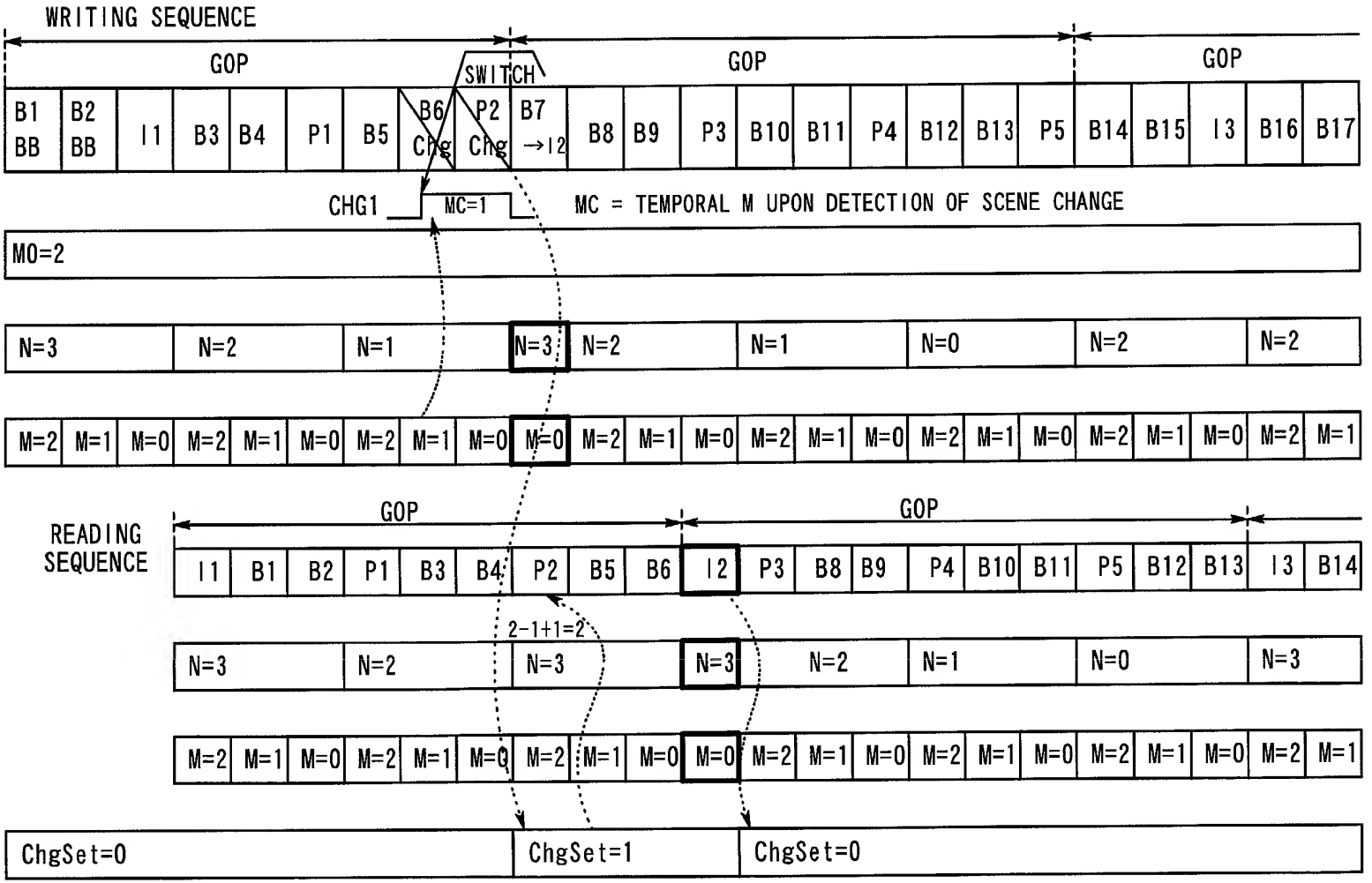

WRITING SEQUENCE
GOP
SWITCH
GOP
GOP
B1 BB
B2 BB
I1
B3
B4
P1
B5
B6 Chg
P2 Chg
B7 →I2
B8
B9
P3
B10
B11
P4
B12
B13
P5
B14
B15
I3
B16
B17
CHG1
MC=1
MC = TEMPORAL M UPON DETECTION OF SCENE CHANGE
M0=2
N=3
N=2
N=1
N=3
N=2
N=1
N=0
N=2
N=2
M=2 M=1 M=0 M=2 M=1 M=0 M=2 M=1 M=0 M=0 M=2 M=1 M=0 M=2 M=1 M=0 M=2 M=1 M=0 M=2 M=1 M=0 M=2 M=1
READING SEQUENCE
GOP
GOP
I1
B1
B2
P1
B3
B4
P2
B5
B6
I2
P3
B8
B9
P4
B10
B11
P5
B12
B13
I3
B14
2-1+1=2
N=3
N=2
N=3
N=3
N=2
N=1
N=0
N=3
M=2 M=1 M=0 M=2 M=1 M=0 M=2 M=1 M=0 M=0 M=2 M=1 M=0 M=2 M=1 M=0 M=2 M=1 M=0 M=2 M=1
ChgSet=0
ChgSet=1
ChgSet=0

FIG. 21

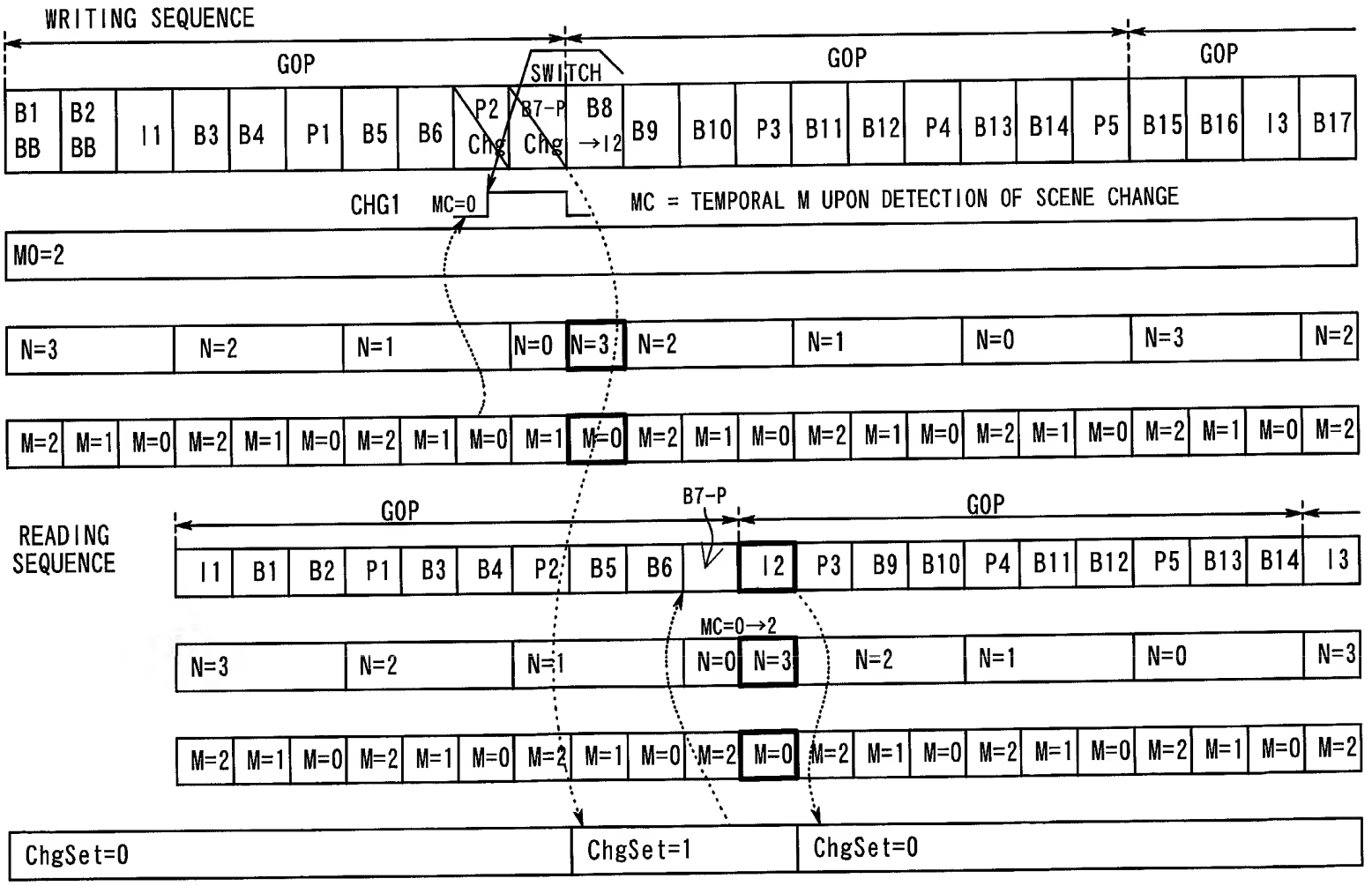

WRITING SEQUENCE
GOP
SWITCH
GOP
GOP
B1 BB
B2 BB
I1
B3
B4
P1
B5
B6
P2 Chg
B7-P Chg
B8 →I2
B9
B10
P3
B11
B12
P4
B13
B14
P5
B15
B16
I3
B17
CHG1
MC=0
MC = TEMPORAL M UPON DETECTION OF SCENE CHANGE
MO=2
N=3
N=2
N=1
N=0
N=3
N=2
N=1
N=0
N=3
N=2
M=2 M=1 M=0 M=2 M=1 M=0 M=2 M=1 M=0 M=1 M=0 M=2 M=1 M=0 M=2 M=1 M=0 M=2 M=1 M=0 M=2 M=1 M=0 M=2
READING SEQUENCE
GOP
B7-P
GOP
I1
B1
B2
P1
B3
B4
P2
B5
B6
I2
P3
B9
B10
P4
B11
B12
P5
B13
B14
I3
MC=0→2
N=3
N=2
N=1
N=0
N=3
N=2
N=1
N=0
N=3
M=2 M=1 M=0 M=2 M=1 M=0 M=2 M=1 M=0 M=2 M=0 M=2 M=1 M=0 M=2 M=1 M=0 M=2 M=1 M=0 M=2
ChgSet=0
ChgSet=1
ChgSet=0

FIG. 22